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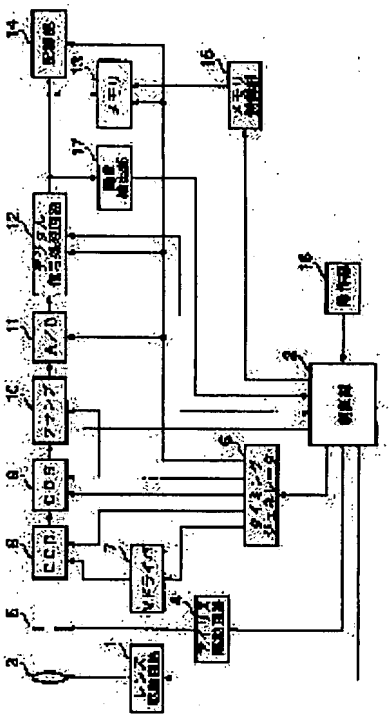
(54) IMAGE PICKUP DEVICE

(57)Abstract:

PURPOSE: To accurately set up a focus and exposure by providing this image pickup device with a means for focusing a subject at the time of judging the stationary state of the subject based upon movement detected by a movement detecting means and a means for setting up exposure.

CONSTITUTION: A movement detecting part continuously detects the movement of a subject image in a frame. Namely a picture signal in each frame is stored in a memory 13, a movement vector V is calculated based upon the correlation of each frame and a moving vector converging area in which an object is static is extracted. A control part 2 uses data corresponding to the movement vector converging area out of focus data obtained by a digital signal processing circuit 12 for a focus and outputs required data to a lens driving circuit 1 to move a focusing lens 3, so that a focused subject image is formed on a CCD 8. Data corresponding to the moving vector converging area out of exposure data obtained by the circuit 12 are used for exposure to determined shutter speed and stop.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

Notes:
1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

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Dictionary: Last updated 07/20/2007 / Priority:

FULL CONTENTS

[Claim(s)]

[Claim 1] In the imaging device equipped with the image pick-up lens which takes in a photographic subject image, the image sensor which carries out photoelectrical conversion of the photographic subject image taken in with this image pick-up lens, and a signal-processing means to process the picture information outputted by this image sensor It has a motion detection means to detect a motion of said photographic subject image based on the picture information outputted from a memory means to memorize the picture information outputted from said signal-processing means, and the memory information memorized by this memory means and said signal-processing means. The imaging device characterized by having a focus means to focus for said photographic subject when it is judged that said photographic subject is standing it still based on the motion detected by said motion detection means.

[Claim 2] The imaging device according to claim 1 characterized [the feature and / to carry out] by having an exposure setting means to assign exposure to said photographic subject when it is judged that said photographic subject is standing it still based on the motion detected by said motion detection means.

[Claim 3] The imaging device according to claim 2 characterized by having a photography means to photo said photographic subject when it focuses by said focus means and exposure by said exposure setting means is set up.

[Claim 4] It is the imaging device according to claim 1 to 3 characterized by detecting a motion of said photographic subject while it has self-timer photography mode and the timer according [said motion detection means] to said self-timer photography mode is operating.

[Claim 5] [a means] also after focusing by said focus means and said motion detection means' setting up exposure by said exposure setting means, while detecting a motion of said photographic subject When the motion of said photographic subject detected by said motion detection means is smaller than a predetermined value, while taking a photograph by said self-timer photography mode It is the imaging device according to claim 4 characterized by having a self-timer control means to stop operation of said timer when a motion of said photographic subject is larger than said predetermined value.

[Claim 6] It is the imaging device according to claim 5 with which said self-timer control means is characterized by re-operating said timer when a motion of said photographic subject after a stop of said timer becomes smaller than said predetermined value.
[Claim 7] It is the imaging device according to claim 1 to 6 characterized by said motion detection means being a vector detection means.
[Claim 8] The picture information outputted from said signal-processing means is an imaging device according to claim 1 to 7 characterized by said motion detection means being a luminance transition detection means to detect change of said luminosity information including said photographic subject's luminosity information.

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to imaging devices, such as an electronic "still" camera.
[0002]
[Description of the Prior Art] The thing as shown in drawing 5 as this kind of an imaging device is known conventionally.
[0003] Namely, in the conventional imaging device, the timing generator (TG) 51 generates a perpendicular transmission pulse and a level transmission pulse. While this perpendicular transmission pulse is inputted into CCD53 through the perpendicular drive (V driver) circuit 52, said level transmission pulse is inputted into direct CCD53, and drives the perpendicular transmission part and level transmission part of CCD53. And photoelectrical conversion of the photographic subject image which carried out image formation to CCD53 is carried out by this CCD53. This image data (analog signal) by which photoelectrical conversion was carried out is changed into a digital signal through the CDS circuit 54 and the clamp circuit 55 in the A/D conversion circuit 56, it is inputted into the digital-signal-processing circuit 57, and signal processing, such as luminosity and color separation, is performed in this digital-signal-processing circuit 57. and -- being based on instructions from the control part 60, when the output signal from the digital-signal-processing circuit 57 is inputted into the Records Department 58 and the ON output of the release switch formed in the final controlling element 59 is inputted into the control part 60 -- said output signal -- direct -- or it compresses and records on a recording medium.
[0004] Moreover, the focal data obtained in the digital-signal-processing circuit 57 is inputted into the control part 60, and this control part 60 carries out image formation of the photographic subject image which outputs necessary data, was made to drive the lens drive circuit 61, was made to move the focusing lens 62 on an optic axis, and focused on CCD53. Moreover, the exposure data obtained in the digital-signal-processing circuit 57 is inputted into the control part 60. This control part 60 determines shutter speed and an iris diaphragm which agree in a predetermined program diagram. About shutter speed, necessary data is

outputted to TG51, the exposure time of CCD53 is determined, necessary data is outputted to the iris drive circuit 63 about an iris diaphragm, and the amount of change of an iris 64 is set up.

[0005] Moreover, when picturizing in the above-mentioned conventional imaging device using a self-timer function, the direction of an imaging device is changed so that it may go into a position [a position / a focus field] to make it focus, the 1st switch which is the stroke of the 1st of a release switch is turned on, and a focus is united with a necessary position. and being in this state, namely, turning on the 1st switch, and having fixed the focusing lens 62 -- an intention of a photography person -- ********** -- the direction of an imaging device is changed and a frame is fixed. And photography is performed, after switch [2nd] on a release switch and it operates a timer, after fixing an imaging device strongly, and a photography person moves to the position settled in a frame, and makes a pose and a timer is completed.

[0006]

[Problem to be solved by the invention] however, ** to which the following problems were in the above-mentioned conventional imaging device -- [an object / the object (he is not a target photographic subject) in distance / distance / to make it focusing beforehand is put into a focus field, and] Since the photography person who is a photographic subject cannot be made to focus directly after uniting a focus when taking a photograph by ** self-timer which must change a frame in the direction which a photography person means, and has troublesomeness in operation, ** which cannot obtain an exact focus -- when uniting with a target photographic subject correctly photos ** exposure which cannot put a focus together when an object does not exist in a place [a place] to make it focus beforehand by difficult ** self-timer When the object interrupted between an imaging device and a photographic subject appears during self-timer operation This object also had a possibility of copying together, and when the direction of ** imaging device it becomes impossible to obtain a desired picture was not able to be changed, there was a problem of a photographic subject always being located in the focus field of the center of a frame.

[0007] It aims at offering the imaging device which can carry out for making this invention in view of such an above-mentioned problem, and being able to unite a focus and exposure simply and correctly, and can always obtain a desired picture.

[0008]

[Means for solving problem] The image pick-up lens with which this invention takes in a photographic subject image in order to attain the above-mentioned purpose, In the imaging device equipped with the image sensor which carries out photoelectrical conversion of the photographic subject image taken in with this image pick-up lens, and the signal-processing means which carries out signal processing of the picture information outputted by this image sensor It has a motion detection means to detect a motion of said photographic subject image based on the picture information outputted from a memory means to memorize the picture information outputted from said signal-processing means, and the memory information memorized by this memory means and said signal-processing means. It is characterized by having a focus means to focus for said photographic subject when it is judged that said photographic subject is standing it still based on the motion detected by said motion detection means. Furthermore, when it is judged that said photographic

subject is standing it still based on the motion detected by said motion detection means, it is characterized by having an exposure setting means to assign exposure to said photographic subject.
[0009] Moreover, when it focuses by said focus means and exposure by said exposure setting means is set up, it is characterized by having a photography means to photo said photographic subject.
[0010] Furthermore, this invention has self-timer photography mode, and is characterized by said motion detection means detecting a motion of said photographic subject, while the timer by said self-timer photography mode is operating. Moreover, [a means] also after focusing by said focus means and said motion detection means' setting up exposure by said exposure setting means, while detecting a motion of said photographic subject When the motion of said photographic subject detected by said motion detection means is smaller than a predetermined value, while taking a photograph by said self-timer photography mode It is characterized by having a self-timer control means to stop operation of said timer when a motion of said photographic subject is larger than said predetermined value. Furthermore, said self-timer control means is characterized by re-operating said timer, when a motion of said photographic subject after a stop of said timer becomes smaller than said predetermined value.
[0011] Moreover, in the above-mentioned imaging device, picture information which is characterized by said motion detection means being a vector detection means, or is outputted from said signal-processing means is characterized by said motion detection means being a luminance transition detection means to detect change of said luminosity information including said photographic subject's luminosity information.
[0012]
[Function] According to the above-mentioned composition, a motion of a photographic subject is detected based on a motion vector or a luminance transition, and after it is judged that the motion stood it still, focus / exposure setup is made.
[0013] Moreover, a motion of a photographic subject is detected also during a self-timer operation, and when a motion of a photographic subject is larger than a predetermined value (i.e., when it is judged that objects other than a photographic subject invaded), self-timer operation is stopped.
[0014]
[Working example] The work example of this invention is hereafter explained in full detail based on Drawings.

[0015] Drawing 1 is the block configuration figure of the electronic "still" camera as one work example of the imaging device concerning this invention.
[0016] In this figure, 1 is a lens drive circuit, and it connects with the control part 2 and it controls the position on the optic axis of the focusing lens 3 based on the control signal from this control part 2. 4 is an iris drive circuit, and it connects with the control part 2 and it controls the amount of change of an iris 5 based on the control signal from this control part 2.
[0017] The timing generator (TG) 6 is connected to CCD8 as the perpendicular drive (V driver) circuit 7 and an image sensor, the CDS circuit 9, the clamp circuit 10, the A/D conversion circuit 11, the digital-signal-processing circuit 12, a memory 13, and the Records Department 14. The bottom of control various control

signals of the control part 2 are generated, and said various control signals are supplied to each [these] composition part.

[0018] That is, the V driver circuit 7 outputs the control pulse which amplified the perpendicular transmission pulse generated from TG6 to predetermined amplitude. Moreover, the V driver circuit 7 and the level transmission pulse from TG3 are inputted, and CCD8 carry out photoelectrical conversion of the photographic subject image by which penetrated the focusing lens 3 and the iris 5, and image formation was carried out to this CCD8. The CDS circuit 9 performs a correlation double sampling based on the control signal from TG6 and the control part 2, and performs removal of a low frequency wave noise etc. The clamp circuit 10 adjusts the input DC level of the output signal from the CDS circuit 9. The A/D conversion machine 11 changes into a digital signal the analog signal outputted from the clamp circuit 10. In the digital-signal-processing circuit 12, predetermined processing of luminosity and color separation, aperture amendment, gamma correction, etc., etc. is performed based on the output signal from bottom TGof control of control part 26. A memory 13 memorizes temporarily the image data outputted from the bottom digital-signal-processing circuit 12 of control of the memory control part 15, and the Records Department 14 records the image data which carries out an abbreviation synchronization and is outputted to operation of the release switch formed in the final controlling element 16 from the digital-signal-processing circuit 12 on a recording medium. The motion primary detecting element 17 detects a motion of a photographic subject based on the output signal outputted from the digital-signal-processing circuit 12, and supplies the detection signal to the control part 2. In addition, a release switch has the 1st the stroke and the stroke of the 2nd which differ in a stroke according to the bottom state of the **, and supplies these stroke signals to the control part 2. That is, a release switch has the 1st switch and 2nd switch, when the 1st switch turns on, the 1st stroke signal is supplied to the control part 2, and when the 2nd switch turns on, the 2nd stroke signal is supplied to the control part 2.

[0019] Thus, in the constituted electronic "still" camera, the level transmission pulse generated from TG6 is inputted into CCD8, and drives the level transmission part of this CCD8. Moreover, the perpendicular transmission pulse generated in TG6 is sent out to the V driver circuit 7, is inputted into back CCD8 amplified by predetermined amplitude, and drives the perpendicular transmission part of this CCD8. And photoelectrical conversion is carried out by this CCD8, and the photographic subject image on CCD8 by which image formation was carried out through the focusing lens 3 and the iris 5 is inputted into the CDS circuit 9. And in the CDS circuit 9, while removal of a low frequency wave noise is made by correlation double sampling, a picture signal portion is taken out among the output signals from CCD8, and suitable amplification is performed. And after the output signal from the CDS circuit 9 is outputted to the clamp circuit 10 and makes DC level of this output signal agree on the input standard DC level of the A/D conversion circuit 11, it is outputted to the A/D conversion circuit 11. In the A/D conversion circuit 11, an analog picture signal is changed into a 10-bit digital image signal, and this digital image signal is inputted into the digital-signal-processing circuit 12.

[0020] A deer is carried out and luminosity and color separation are performed in the digital-signal-

processing circuit 12. That is, while performing aperture amendment, detail ENHANSA, gamma correction, etc. about a luminosity signal, about a color signal, a primary color signal is created by a predetermined matrix, and white balance processing, gamma correction, etc. are performed. And these luminosity signal and a color signal are outputted to a memory 13, the motion primary detecting element 17, and the Records Department 14. A memory 13 memorizes temporarily the picture signal in every frame outputted from the digital-signal-processing circuit 12. In the motion primary detecting element 17, it is detected whether the correlation for every frame is taken based on the luminosity signal outputted from the digital-signal-processing circuit 12, a color signal, and the memory data memorized by the memory 13, and a motion of the photographic subject in a frame is detected, and it is completed by motion of the photographic subject concerned in which position. moreover -- the Records Department 14 minds the control part 2, after a release switch is switched [2nd] on -- said picture signal -- direct -- or it compresses and records on a recording medium.

[0021] Moreover, it is related with focal processing and exposure processing. The focal data obtained in the digital-signal-processing circuit 12 is inputted into the control part 2 like the former and abbreviation, and this control part 2 carries out image formation of the photographic subject image which outputs necessary data, was made to drive the lens drive circuit 1, was made to move the focusing lens 3 on an optic axis, and focused on CCD8. Moreover, the exposure data obtained in the digital-signal-processing circuit 12 is inputted into the control part 2. This control part 2 determines shutter speed and an iris diaphragm which agree in a predetermined program diagram, outputs necessary data to TG6 about shutter speed, determines the exposure time of CCD8, outputs necessary data to the iris drive circuit 4 about an iris diaphragm, and sets up the amount of change of an iris 5.

[0022] Next, it explains, referring to the flow chart of drawing 2 about the procedure of operation when taking a photograph in self photography mode.

[0023] First, a photography person operates a final controlling element 16, chooses self photography mode, changes direction of a camera in the direction which a photography person means, fixes a frame, switches [1st] on a release switch, and starts a timer, and a photography person moves to the position settled in a frame (Step S1). Next, in the motion primary detecting element 17, detecting a motion of the photographic subject image in a frame is continued (Step S2). That is, since the photography person went into the inside of a photographic subject's frame, the picture signal in every frame is memorized in a memory 13, the correlation for every frame is taken, and motion vector V is computed.

[0024] Subsequently, the convergence field of motion vector V where an object stands it still is extracted (Step S3). Here, when the photography person who became a photographic subject stops at a certain place in a frame and makes a pose, it is judged that it was completed by motion vector V at the place. Or an operation error is computed by using either a luminosity signal and a color signal, and subtracting the image data in every frame based on instructions of the memory control part 15. When completed by this operation error into a predetermined value, it judges that the photography person who is a photographic subject stood it still at a certain place in a frame, and it is judged that it was completed by motion vector V. And this amount

V of motion vectors makes the field settled below in arbitrary values the convergence field of motion vector V.

[0025] Next, an automatic focus is performed with an automatic exposure (Step S4). Namely, in order to unite a focus and exposure with said convergence field in the control part 2 About a focus, the data equivalent to the motion vector convergence field of the focal data obtained in the digital-signal-processing circuit 12 is used, necessary data is outputted to the lens drive circuit 1, the focusing lens 3 is moved, and image formation of the photographic subject image which focused is carried out on CCD8. Moreover, about exposure, the data equivalent to the motion vector convergence field of the exposure data obtained in the digital-signal-processing circuit 12 is used, and it is determined that shutter speed and an iris diaphragm will suit the predetermined program diagram decided beforehand. When shutter speed outputs necessary data to TG6, the exposure time of CCD8 is set up and, specifically, an iris diaphragm sets up the amount of change of an iris 5 by outputting necessary data to the iris drive circuit 4. Thus, after a setup and focus of exposure are completed, the 2nd switch is turned on (Step S5) and automatic photography is performed (Step S6). In addition, after a setup of Step S4 is completed in this case, a timer may be started, and you may perform automatic photography after predetermined time progress. and the picture signal at this time -- direct -- or it is compressed, and is recorded on the recording medium of the Records Department 14, and processing is completed.

[0026] Drawing 3 is the copy figure in which detection of the correlation for every frame detected motion vector V, and the motion vector V concerned showed the situation to convergence.

[0027] As shown in drawing 3 (a), since the photographic subject (A shows among a figure) entered in the frame (a large frame shows among a figure), the picture signal in every frame is memorized one by one in a memory 13, and the correlation for every frames of these is detected. Motion vector V is computed by dividing a detection field into the block of arbitrary sizes in the field which cannot detect this correlation, moving the block of the present frame suitably, and detecting correlation with the block before the old frame, i.e., one frame. That is, when the image data of the photographic subject of drawing 3 (a) carries out abbreviation coincidence with the image data of the field C of drawing 3 (b), as shown in drawing 3 (c), the photographic subject in Field C can judge moving in the direction of arrow D. And when it is stood still at a certain place in Field E and a pose is made as are shown in drawing 3 (d) after that, and motion vector V becomes gradually small in Field E and is finally shown in drawing 3 (e), the thing in which the object stood it still and to judge can be performed, and motion vector V will be converged in the field concerned.

[0028] Drawing 4 is a flow chart which shows the 2nd work example.

[0029] In the 2nd work example, after performing the same processing as Step S1 of the 1st work example - Step S4 at Step S11 - Step S14, a timer is reset and a timer (Step S15) is started (Step S16). Subsequently, also during timer operation, motion vector V is detected with the same technique as the 1st work example of the above (Step S17), and it is judged whether the absolute value of motion vector V is smaller than the predetermined value A (Step S18). And when the judgment result is denial (No) (i.e., when the absolute value of motion vector V exceeds the predetermined value A), it judges with objects other than a target

photographic subject having invaded in the frame, and a timer is reset again, and the new start of this (Step S15) timer is carried out.

[0030] On the other hand, when the judgment result of Step S18 is affirmation (Yes), motion vector V is settled in the error and it judges that no objects other than an object have invaded, and it is judged whether the timer value T of the timer did predetermined time B progress of (Step S18). And when the judgment result of Step S18 is denial (No), while repeating execution of the judgment step of Step S18 When the timer value T goes through the predetermined time B, it progresses to Step S20 and the 2nd switch is turned on, Step S21 and Step S22 as well as Step S6 of the 1st work example of the above and Step S7 are performed, and processing is ended.

[0031]

[Effect of the Invention] As explained in full detail above, according to the imaging device of this invention, there are the following effects.

[0032] ** A focus and exposure can be correctly united with the photographic subject which wants to take a photograph.

[0033] ** It becomes unnecessary to carry out frame movement for uniting a focus and exposure with the photographic subject which wants to take a photograph.

[0034] ** Even when objects other than the photographic subject of a request during self-timer operation trespass upon the inside of a frame, it can prevent that objects other than the photographic subject of said request copy together.

[0035] ** After uniting a focus like before, it becomes unnecessary to change a frame in the direction which a photography person means, and the troublesomeness of operation can be canceled.

[Brief Description of the Drawings]

[Drawing 1] It is the block configuration figure of the electronic "still" camera as one work example of the imaging device concerning this invention.

[Drawing 2] It is the flow chart which shows the procedure of this invention of operation.

[Drawing 3] It is the copy figure in which detection of the correlation for every frame detected motion vector V, and the motion vector V concerned showed the situation to convergence.

[Drawing 4] It is the flow chart which shows the procedure of the 2nd work example of this invention of operation.

[Drawing 5] It is the block configuration figure of the conventional imaging device.

[Explanations of letters or numerals]

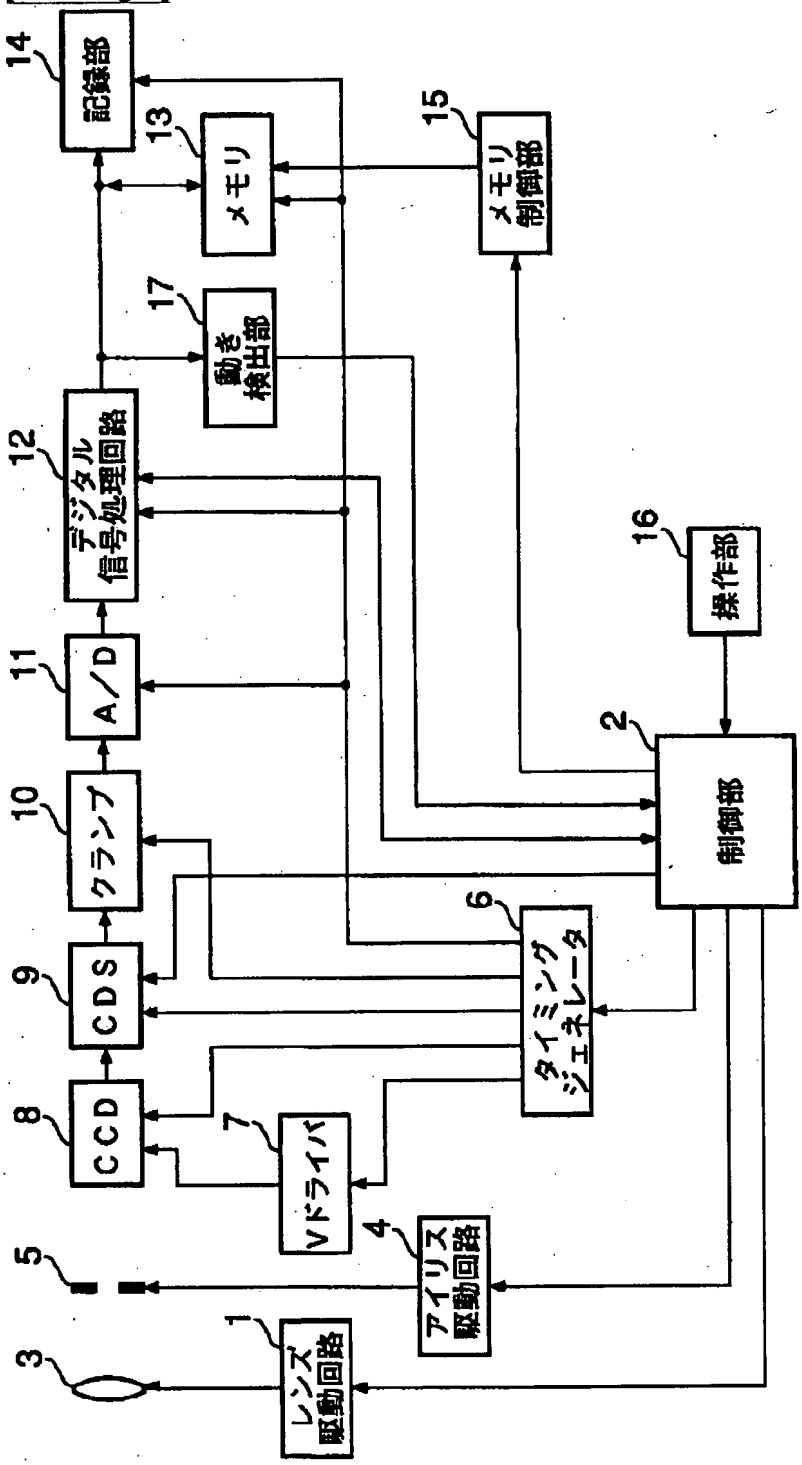
2 Control Part (Focus Means, Exposure Setting Means)

3 Image Pick-up Lens (Focusing Lens)

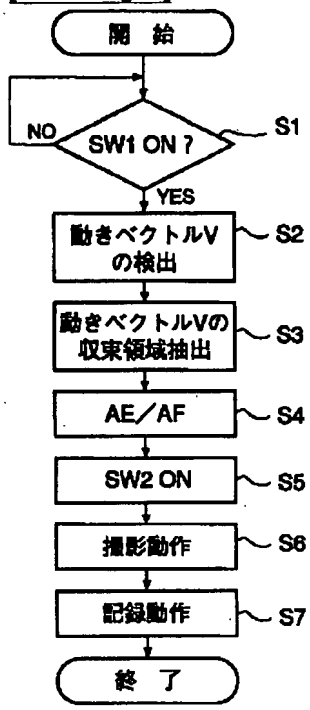
8 CCD (Image Sensor)

12 Digital-Signal-Processing Circuit (Signal-Processing Means)
13 Memory (Memory Means)
17 Motion Primary Detecting Element (Motion Detection Means)

[Drawing 1]



[Drawing 2]



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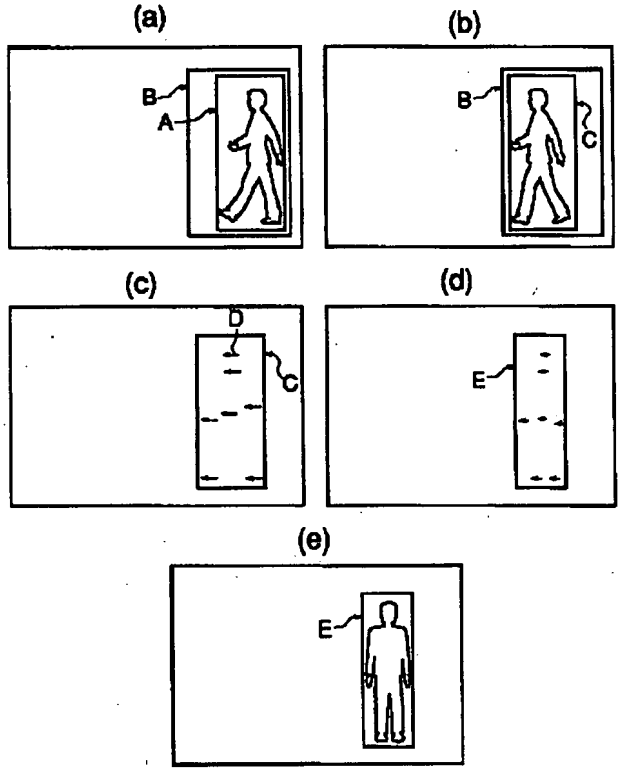

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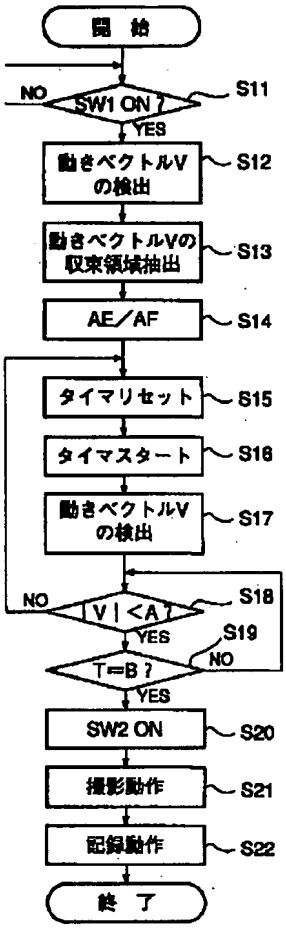
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S13
AE／AF
S14
タイマリセット
S15
タイマスタート
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S21
記録動作
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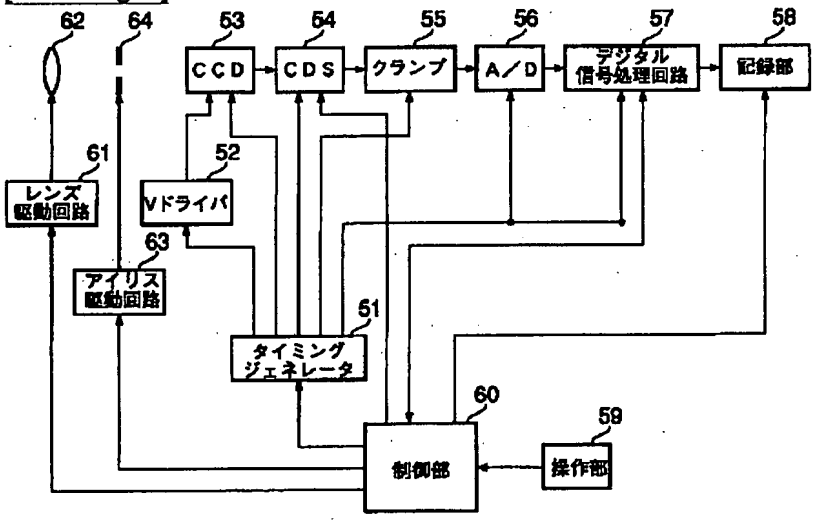
終 了

[Drawing 5]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操作部

[Translation done.]